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When can a woman have an intrauterine device inserted? A systematic review[☆]

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Abstract

Background—Intrauterine device (IUD) insertion during menses may be viewed as preferable by some providers, as it provides reassurance that the woman is not pregnant. However, this practice may result in unnecessary inconvenience and cost to women. The objective of this systematic review is to evaluate the evidence for the effect of inserting IUDs on different days of the menstrual cycle on contraceptive continuation, effectiveness and safety.

Study Design—We searched the MEDLINE database for peer-reviewed articles published in any language from database inception through March 2012 concerning the effect of inserting copper IUDs (Cu-IUD) or levonorgestrel-releasing IUDs (LNG-IUDs) on different days of the menstrual cycle on contraceptive continuation, effectiveness, and safety. The quality of each individual piece of evidence was assessed using the United States Preventive Services Task Force grading system.

Results—We identified eight articles that met the criteria for review. Each study examined the Cu-IUD; no studies were identified that examined the LNG-IUD. Overall, these studies suggest that timing of Cu-IUD insertion has little effect on longer term outcomes (rates of continuation, removal, expulsion, or pregnancy) or on shorter term outcomes (pain at insertion, bleeding at insertion, immediate expulsion). Specifically, there was no evidence to suggest that outcomes were better when Cu-IUD insertions were performed during menses. Limitations of the studies include small sample sizes for insertions performed during later days of the menstrual cycle and non-randomized assignment to timing of insertion.

Conclusions—There is fair evidence (body of evidence grading: II-2, fair) indicating that timing of Cu-IUD insertion has little effect on contraceptive continuation, effectiveness or safety.

Keywords

Intrauterine devices; Insertion; Menstruation; Systematic review

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1. Introduction

Intrauterine device (IUD) insertion during menses may be viewed as preferable by some providers, as it provides reassurance that the woman is not pregnant. However, for women seeking IUD insertion during other times in the menstrual cycle, this practice may result in unnecessary inconvenience and cost. Issues to consider when making recommendations regarding when during the menstrual cycle (i.e., not postpartum or postabortion) a woman can start IUD use include making sure the woman is not pregnant and whether IUD insertion at different times during the menstrual cycle has different effects on contraceptive continuation, effectiveness or safety. A list of criteria has been developed by the World Health Organization to guide the provider in determining whether a woman is pregnant [1]. This review examines the evidence for inserting IUDs at different times during the menstrual cycle with regard to pain, bleeding, expulsion, and contraceptive effectiveness.

2. Materials and methods

We searched the MEDLINE database for peer-reviewed articles published in any language from database inception through March 2012 concerning the effect of inserting IUDs at different times during the menstrual cycle with regard to pain, bleeding, continuation, expulsion and pregnancy risk using the following search strategy:

(levonorgestrel AND (intrauterine devices[mesh] OR iud OR iucd OR ius OR intrauterine system OR intra-uterine system OR intrauterine device OR intra-uterine device)) OR Mirena OR (copper IUD OR Paragard OR Nova T OR intrauterine device OR copper releasing IUD) AND (insert* AND (cycle OR menstruat*)) AND (“bleeding” OR pain OR expulsion OR continuation OR pregnancy) Limits: Humans

Additionally, the Cochrane Library was searched for any systematic reviews on this topic. We also hand-searched reference lists from articles identified by the search and key review articles to identify any additional articles.

2.1. Study selection

We reviewed titles as well as abstracts to identify studies investigating the effects of inserting IUDs at different times during the menstrual cycle on pain, bleeding, continuation, expulsion and pregnancy risk. We excluded studies that examined IUDs other than copper IUDs (Cu-IUDs) or levonorgestrel-releasing IUDs (LNG-IUDs).

2.2. Study quality assessment

The evidence was summarized and systematically assessed through the use of standard abstract forms [2]. The quality of each individual piece of evidence was assessed using the United States Preventive Services Task Force grading system [3].

2.3. Data synthesis

We did not compute summary measures of association due to heterogeneity across the identified studies with respect to the manner in which outcomes were reported, study design, study population and lengths of follow-up.

3. Results

The search strategy identified a total of 391 articles. After reviewing the titles and abstracts of these articles, as well as the full articles when necessary, eight articles met our criteria for inclusion in this review (Table 1) [4–11]. No systematic reviews were found from the search of the Cochrane database. Each of the eight studies included in this review examined the Cu-IUD. We did not identify studies examining the timing of insertion of the LNG-IUD.

Four cohort studies examined the effects of Cu-IUD insertion at different times during the menstrual cycle on rates of continuation, removal, expulsion, and/or pregnancy [4,5,9,10]. A study of 9904 women found that rates of expulsion in the first two months post-insertion were highest among women with insertions on Cycle Days 1–5 (50.3 per 1000), with rates decreasing to 30.5 for insertion on Cycle Days 6–10, 24.0 for insertion on Cycle Days 11–17 and 22.0 for insertions on Cycle Day 18 or later ($p < .0001$ for trend) [10]. However, removals for pain and bleeding increased as day of the cycle increased, primarily for insertions after Day 17; removal rates were 20.9 per 1000 for Cycle Days 1–5 and 20.6 per 1000 for Cycle Days 6–10, increasing to 27.2 for Cycle Days 11–17 and to 36.7 per 1000 for Cycle Day 18 and later (p for trend = 0.01). Risk of pregnancy also increased with increasing cycle day of insertion, but the trend did not reach statistical significance ($p = .13$). The authors estimated from these data that there would be nine excess IUD discontinuations per every 1000 insertions before Cycle Day 11 due to expulsion, pain and bleeding, or pregnancy than if insertions were done after Cycle Day 11. There were no observed trends for rates of expulsions, removals for pain and bleeding or pregnancy during the third and fourth months post-insertion.

A second study examined a cohort of 2536 women and found that continuation rates were highest among those who underwent insertion during menses or immediately thereafter [4]. Continuation at 12 months was 92.0% for insertion during Cycle Days 1–3, 89.3% for Cycle Days 4–7, 87.8% for Cycle Days 8–14, 88.3% for Cycle Days 15–21 and 84.8% for Cycle Days 22; no statistical comparison was reported. Total removals as well as removals for bleeding and pain and for infection were highest among those with insertions on Cycle Days 22. Expulsion rates were highest among those with insertions on Cycle Days 8–14 (3.2%), compared with those with insertions on Cycle Days 1–3 (1.6%), Cycle Days 4–7 (1.9%), Cycle Days 15–21 (1.1%), or Cycle Days 22 (1.2%), although no statistical comparison was reported. Pregnancy rates did not differ by timing of insertion ($p > .05$).

A third cohort study examined 867 women with IUD insertions occurring during or after menses and found that over 12 months, rates of continuation, expulsion, removal and pregnancy did not differ by timing of insertion ($p > .10$) [5]. A fourth cohort study examined 615 women, including 156 HIV-positive women and 493 HIV-negative women, and found that over four months, those with insertions during menses had similar rates of expulsion,

removal and pelvic inflammatory disease (PID) as those with insertions outside the menses, although direct statistical comparisons were not reported [9]. There were no pregnancies in either group. The odds for any IUD complication did not significantly differ among those with insertions outside menses versus during menses [adjusted odds ratio (OR)= 1.65, 95% confidence interval (CI) 0.21–12.91].

A nested case-control identified for this review also examined the association between IUD expulsion and timing of IUD insertion [11]. Among participants of a clinical trial examining different types of Cu-IUDs, 70 women who experienced an IUD expulsion during the trial's 12-month follow-up period were classified as cases and 1536 women with an IUD in place at their last study visit were classified as controls. The odds for expulsion did not differ among those with insertions outside menses compared to those with insertions during menses (unadjusted OR=0.8, 95% CI 0.5–1.5).

Four studies [6–9] examined the effects of timing of IUD insertion on insertion problems, including pain, bleeding, and/or immediate expulsion. A subgroup analysis of 29 nulliparous women enrolled in a clinical trial of an analgesic agent reported that the pain index (total amount of pain, discomfort and bleeding over 7 days post-insertion) was positively correlated with the day of the cycle on which the IUD was inserted (Spearman $r_s=0.4559$) [6]. A second study of 84 nulliparous women reported that immediate pain following IUD insertion was independent of day of cycle [7]. Further description of these results is lacking in both studies. A subgroup analysis of women enrolled in a clinical trial of prophylactic ibuprofen at IUD insertion found pain after insertion measured by a visual analog scale was highest among those with insertions <6 days or 11 days since the start of last menstrual period and lowest among those with insertions 6–10 days since the start of last menstrual period ($p<.05$ non-parametric Kruskal-Wallis test) [8]. Another study identified for this review was a baseline assessment of 1667 women undergoing IUD insertion, of whom some were selected for follow-up in a cohort study already described [9]. This study found that pain at the time of IUD insertion was more common among those with insertions outside menses than during menses (2.1% vs. 0%) and that rates of bleeding at the time of insertion were similar (1.6% vs. 1.8%), although no direct statistical comparisons were reported. Immediate expulsion (not further defined) was more common among those with insertions during menses (7.0%) than those with insertions outside of menses (2.8%). A statistical comparison of immediate expulsions that also included a third group of women with oligomenorrhea/amenorrhea (1.7%) was statistically significant ($p<.05$). The odds for any IUD insertion problem among those with insertions outside versus within menses was non-significant (adjusted OR=0.54, 95% CI 0.18–1.59).

4. Discussion

Overall, the eight studies included in this review suggest that timing of Cu-IUD insertion has little effect on longer term outcomes (rates of continuation, removal, expulsion or pregnancy) or on shorter term outcomes (pain at insertion, bleeding at insertion, immediate expulsion). Rates of expulsion and rates of removal in relation to timing of Cu-IUD insertion were examined in four prospective cohort studies [4,5,9,10], while one nested case-control study examined the association between IUD expulsion and timing of IUD insertion [11].

These studies found little evidence that expulsion rates or removal rates varied by timing of insertion during the menstrual cycle or specifically that rates were lower when insertions were performed during menses. Additionally, two prospective cohort studies provided evidence on continuation rates over 12 months by timing of IUD insertion. In one, continuation rates were highest among those with insertion during menses or immediately thereafter [4]; however, no statistical comparison was reported. In the other, rate of continuation did not differ by timing of insertion [5]. In each of the reviewed studies, the majority of women underwent IUD insertion during or soon after menses, which may have limited their power to examine insertions later in the menstrual cycle.

Three large, prospective cohort studies examined pregnancy rates associated with Cu-IUD insertions during different times of the menstrual cycle and found little evidence to suggest that pregnancy rates vary by timing of IUD insertion [4,5,10]. Despite large sample sizes in these studies, pregnancy rate estimates are based on small numbers of pregnancies. In addition, given the assignment to IUD insertion on certain cycle days was not randomized, it is possible that clinicians may have chosen to insert IUDs mid-cycle only in women they were confident were not pregnant [10].

Four studies examined the effects of timing of IUD insertion on pain immediately or soon after insertion and found little evidence for an association. One small study reported that the pain index was positively correlated with the day of the cycle on which the IUD was inserted, but no further details were presented [6]. Another small study reported that pain immediately following IUD insertion was independent of day of cycle [7], but actual results were not presented. A subgroup analysis of women enrolled in a clinical trial of prophylactic ibuprofen at IUD insertion found pain scores after insertion were highest among those with insertions <6 days or 11 days since the start of last menstrual period and lowest among those with insertions 6–10 days since the start of last menstrual period [8]. However, the absolute pain scores were quite low and the clinical significance of small differences in pain score is unclear. Additionally, as a subgroup analysis, the study was not powered to examine differences by timing of insertion; less than 5% of insertions occurred 6 days or more after the start of the last menstrual cycle.

Another study also examined immediate expulsion and bleeding at insertion. This large cross-sectional analysis reported pain was more common among those with insertions outside menses than during menses and rates of bleeding were similar, although no direct statistical comparisons were made and the absolute rates of pain and bleeding were very low [4]. In addition, this study reported that immediate expulsion was more common among those with insertions during menses than those with insertions outside of menses; a statistical comparison of the occurrence of immediate expulsion that included a third group of women with oligomenorrhea/amenorrhea was statistically significant. However, the odds ratio comparing the odds of any IUD insertion problem among those with insertions outside versus within menses was non-significant.

Ensuring a woman is not pregnant is an important issue to consider when making recommendations regarding when during the menstrual cycle a woman can start IUD use. Thus, it is important to consider conception probabilities by cycle day in the absence of

contraceptive use. Information on day-specific estimates of conception come from a prospective study in which estimated day of ovulation was estimated for 696 cycles from 221 women attempting to conceive who collected daily urine samples and recorded days during which intercourse and menstrual bleeding occurred [12,13]. Only 2% of women had entered the fertile window (the five days before ovulation and the day of ovulation itself) by Cycle Day 4 and 17% by Cycle Day 7 [12]. By Days 12 and 13, 54% of women had entered the fertile window. When examining the probability of clinical pregnancy from a single act of intercourse, daily probabilities ranged from 0.4% on Day 5 and 1.7% by Cycle Day 7, to a peak of 9% on Cycle Day 13, with a steep decline thereafter [13]. Women with irregular cycles generally had later and more irregular ovulation, with the peak probability of clinical pregnancy occurring later in the cycle. It is also worth noting the emergency contraceptive effect of the Cu-IUD; the Cu-IUD can be inserted within five days of unprotected intercourse to prevent pregnancy [14,15].

We did not identify any studies regarding the effects of insertion of the LNG-IUD at different times during the menstrual cycle. According to manufacturer insertion instructions, the LNG-IUD can be inserted within seven days of the onset of menstruation or immediately after a first trimester abortion and device replacement can occur at any time during the menstrual cycle (Bayer HealthCare Pharmaceuticals). Unlike the Cu-IUD, the use of the LNG-IUD as an emergency contraceptive has not been studied and is not recommended [15]. It should also be noted that pregnancy during LNG-IUD use carries different clinical concerns because of theoretical concerns that in the event of pregnancy, there may be added risks to the fetus due to hormonal exposure.

In summary, there is fair evidence indicating that insertion of Cu-IUD at different times of the menstrual cycle has little effect on contraceptive safety, continuation or effectiveness. The studies included in this systematic review were limited by small sample sizes for insertions performed during later days of the menstrual cycle and non-randomized assignment to timing of insertion (body of evidence grading: II-2, fair).

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Table 1

Summary of evidence for timing of copper-IUD insertion

Author, year, sources of support	Study design	Population	Outcome	Results	Strengths	Weaknesses	Quality
White, et al. 1980 [10] Source of support not stated	Cohort study 4-month follow-up (rates calculated for months 1–2 and months 3–4) Multicenter (most sites in U.S.)	9094 women, timing of IUD insertions: - 52% Cycle Day 1–5 - 32% Cycle Day 6–10 - 7% Cycle Day 11–17 - 9% Cycle Day 18+ 51% ages 20–29 years 56% nulliparous	Expulsion Removal (for pain and/or bleeding, PID, other medical reasons, or personal reasons) Pregnancy	Rates per 1,000 (months 1–2) Expulsions: 50.3 (Cycle Day 1–5) 30.5 (Cycle Day 6–10) 24.0 (Cycle Day 11–17) 22.0 (Cycle Day 18+) ($p < .0001$) Removals for pain and/or bleeding: 20.9 (Cycle Day 1–5) 20.6 (Cycle Day 6–10) 27.2 (Cycle day 11–17) 36.7 (Cycle Day 18+) ($p = .01$) Pregnancy rate higher among Cycle Day 18+ (6.1) than Cycle Day 1–5 (3.0); trend not significant ($p = .13$) No significant differences in rates of expulsion or removals for pregnancy, PID, other reasons, or personal reasons by timing of insertion No significant differences in month 3–>4 rates for expulsion or removal by timing of insertion Observed trends for expulsions, removals for pain and/or bleeding and pregnancies remained after controlling for age and parity	Large sample size Examined several categories of timing of insertion Standardized by age, parity	Somewhat short follow-up Excluded large number of women from potential study sample (7,724/16,818) because their cycle day of insertion was unknown, they were <3 months postpartum, or they were lost to follow-up during first 3 months	II-2, fair
Akinla, et al. 1975 [4] Ford Foundation, Population Council, Department of International Development Cooperation of the Finnish Foreign Ministry	Cohort study 12-month follow-up Finland	2536 women timing of IUD insertions in cycle: - 16% days 1–3 - 52% days 4–7 - 25% days 8–14 - 4% days 15–21 - 3% days 22+	Expulsion Removal (for bleeding/pain or infection) Pregnancy	Cumulative rates for insertion during Cycle Days 1–3, 4–7, 8–14, 15–21, 22+; Continuation: 92.0, 89.3, 87.8, 88.3, 84.8 Expulsion: 1.6, 1.9, 3.2, 1.1, 1.2 Removals (total): 4.8, 7.3, 7.0, 9.5, 12.9, 8.3 - for bleeding and pain: 2.9, 3.9, 4.0, 6.3, - for infection: 0.3, 1.0, 1.2, 0.0, 3.4 Pregnancy: 1.6, 1.6, 2.0, 1.0, 1.2 ($p > .05$)	Large sample size Several categories of timing of insertion examined	Statistical significance for most comparisons not stated	II-2, fair
Edelman et al. 1979 [5] US Agency for International Development	Cohort study 12-month follow-up Chile	867 women with IUD insertions Timing of TCu-200 IUD insertions ($n=429$) - 50 % during menses	Pregnancy Expulsion Removal for medical reasons Continuation	Distribution of vents (pregnancy, expulsion, removal) similar across all categories of timing of insertion. Timing grouped into during or after menstruation for calculation of rates. All	Relatively low loss to follow-up (7.2% for TCu-200, 10.3% for Cu-7-200) Life-table analysis	Due to small sample size and few events, could not calculate rates for more	II-2, fair

Author, year, sources of support	Study design	Population	Outcome	Results	Strengths	Weaknesses	Quality
Kokonya, et al. 2000 [9] Family Health International, US Agency for International Development	Cohort study 4-month follow-up (subgroup) Kenya	- 30% midcycle phase - 9% proliferative phase - 11% secretory phase Timing of Cu-7-200 IUD insertions (n=438) - 46% during menses - 44% midcycle phase - 7% proliferative phase - 3% secretory phase <1% nulliparous		p>.10 for comparison of rates during vs. after menses: Pregnancy per 100 users		specific insertions timings beyond during or after menses	II-2, fair

Author, year, sources of support	Study design	Population	Outcome	Results	Strengths	Weaknesses	Quality															
		- 4% within menses - 27% oligomenorrhea/amenorrhea 0.6% (baseline group), 1% (follow-up group) nulliparous		p<.05 for comparison of expulsion across menstrual cycle groups, including oligomenorrhea/amenorrhea (1.7%) Adjusted OR for any insertion problem comparing outside vs. within menses group = 0.54 (95% CI 0.18–1.59) Complications n=605, % <table><tr><th></th><th>Outside menses</th><th>Within menses</th></tr><tr><td>PID</td><td>0.2</td><td>0</td></tr><tr><td>Expulsion</td><td>2.4</td><td>4.3</td></tr><tr><td>Removal</td><td>4.3</td><td>0</td></tr><tr><td>Pregnancy</td><td>0</td><td>0</td></tr></table> Adjusted OR for any complication comparing outside vs. within menses group = 1.65 (95% CI 0.21–12.91)		Outside menses	Within menses	PID	0.2	0	Expulsion	2.4	4.3	Removal	4.3	0	Pregnancy	0	0			
	Outside menses	Within menses																				
PID	0.2	0																				
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Zhang, et al. 1992 [11] Family Health International, US Agency for International Development	Nested case-control study Data from a international multicenter clinical trial (randomized to different types of IUDs; only Cu-IUDs included in this study) Follow-up at 1, 2, 6, 12 months after IUD insertion 13 international sites	70 cases with IUD expulsion 1536 controls with IUD in place at last visit Ages 18–40 years Insertions at least 42 days since end of last pregnancy Exclusions included those with removals due to pain/bleeding (n=104)	Expulsion	Timing of insertion during menses, during rest of cycle: - cases: 73%, 27% - controls: 69%, 31% Unadjusted OR for expulsion among those with insertions outside of menses vs. during menses = 0.8 (95% CI 0.5–1.5)	Relatively large sample size Few losses to follow-up	Did not examine finer categories of timing of insertion Unadjusted analysis Excluded data from centers with higher or lower expulsion rates than the others (n=1,001); unclear if this may have impacted results	II-2, fair															
Goldstick 1981 [6] Source of support not stated	Cohort study; subgroup analysis of clinical trial of analgesic agent at IUD insertion England	29 nulliparous women with IUD insertion Ages 18–35 years All nulliparous	Total amount of pain, discomfort, and bleeding over the 7 days post IUD insertion, expressed as a pain index	Pain index was somewhat positively correlated with day of the cycle on which IUD insertion occurred (Spearman rs=0.4559)		Small sample size Unadjusted analysis; only examined correlation No information on how sample was selected from larger trial	II-2, poor															

Author, year, sources of support	Study design	Population	Outcome	Results	Strengths	Weaknesses	Quality
Goldstick and Matthews 1985 [7] Source of support not stated	Cross-sectional study England	84 nulliparous women with IUD insertion Ages 18–40 years All nulliparous	Pain immediately after insertion measured on a 10 cm visual analogue scale	Immediate pain was independent of day of cycle of insertion		or how many were excluded or how many were excluded Small sample size No information on distribution of cycle day Actual pain scores not reported	II-3, poor
Hubacher, et al. 2006 [8] National Institutes of Health	Cross-sectional study; subgroup analysis of clinical trial of prophylactic ibuprofen at IUD insertion Chile	2018 women, timing of IUD insertions: - 95% <6 days - 2% 6–10 days - 3% 11+ days since start of last period Ages 18–49 years 5% nulliparous	Pain after insertion measured by 10-cm visual analogue scale from “no pain” to “worst pain imaginable”	Mean, median level of pain by days since start of last period 1.0, 1.9 (<6 days) 0.2, 1.0 (6–10 days) 0.9, 1.8 (11+ days) p<.05 non-parametric Kruskal-Wallis test	Several categories of timing of insertion examined	Unadjusted analysis 95% of insertions <6 days since start of last period	II-3 fair